
Citation:

Leat, D and Lofthouse, RM and Thomas, U (2015) Implementing Enquiry and Project-based Learning - Revolution or Evolution? Education Today, 65 (2). pp. 12-17. ISSN 1832-4916

Link to Leeds Beckett Repository record:

<https://eprints.leedsbeckett.ac.uk/id/eprint/4009/>

Document Version:

Article (Published Version)

The aim of the Leeds Beckett Repository is to provide open access to our research, as required by funder policies and permitted by publishers and copyright law.

The Leeds Beckett repository holds a wide range of publications, each of which has been checked for copyright and the relevant embargo period has been applied by the Research Services team.

We operate on a standard take-down policy. If you are the author or publisher of an output and you would like it removed from the repository, please [contact us](#) and we will investigate on a case-by-case basis.

Each thesis in the repository has been cleared where necessary by the author for third party copyright. If you would like a thesis to be removed from the repository or believe there is an issue with copyright, please contact us on openaccess@leedsbeckett.ac.uk and we will investigate on a case-by-case basis.

IMPLEMENTING ENQUIRY AND PROJECT-BASED LEARNING – REVOLUTION OR EVOLUTION?

DAVID LEAT, Professor of Curriculum Innovation, Research Centre for Learning and Teaching, School of Education, Communication and Language Sciences, Newcastle University

RACHEL LOFTHOUSE, Head of Teacher Learning and Development (Education), Communication and Language Sciences, Newcastle University

ULRIKE THOMAS, Research Associate, Newcastle University

David Leat, Rachel Lofthouse and Ulrike Thomas argue for a more creative perspective on achievement, based on enquiry-based approaches to children's learning. They explore the concept of 'dominant discourse' in education and the need for this to shift from traditional teaching to an emphasis on student questioning and curiosity which lead to "stunning", rather than pre-specified, learning outcomes.

The Finnish connection

In March 2015 Finland hit the education headlines once again, and social media picked up the story at speed. Finland has long had educational street-cred, holding its head high in the international league tables and hosting many ministerial visitors from around the world, and it is from this secure basis that they are making radical changes to meet what their policy makers see as the genuine needs of their young people in modern times. The news was that plans are afoot (indeed are already being rolled out) to change from a subject-based curriculum to one organised through topics or 'phenomenon-based teaching'. One of the desired features of this approach is collaboration between teaching colleagues in planning and co-teaching, and greater collaboration and enhanced communication between students working in groups to solve real world problems. These headlines in the Guardian of 20 April 2015 demonstrate that curricular and pedagogic alternatives to what Shadow Education Secretary Tristram Hunt called our "industrial model of schooling" are not just imaginable, but also possible. They might even address the compelling argument put forward by 16-year-old Guardian contributor Emma Jacobs, who reminded readers of the cost to the mental health of young people and loss of love of learning caused by the "tick box, formulaic syllabuses" which meant teachers and learners focus on "exam techniques and marking schemes rather than letting discussion develop and encouraging [students] to think widely".

What is EPBL?

One such alternative, imaginable and indeed real, alternative is enquiry- and

project-based learning (hereafter EPBL). There is some confusion about what constitutes enquiry-based learning and its close cousin project-based learning. In essence such learning is driven by substantive questions generated either from student curiosity or a real issue or problem acknowledged by students. Importantly, whilst there may be goals and curriculum coverage, EPBL is generally not governed by pre-specified learning outcomes and one of the challenges in EBPL is to ascertain *what students have learned* so that it may be mapped on to learning trajectories both in subjects and also in key competences. Another characteristic of EPBL is that in most circumstances there is a learning product other than classwork and homework presented to the teacher. Indeed, where possible the products will have an authentic audience either inside or outside school. There are important voices signposting the importance of EPBL, but as yet, little of this enthusiasm is to be found in English government policy – although academies and free schools have sufficient freedom to follow such a route. However it is worth looking further to recognise why it is deemed worthy of consideration.

Curriculum and pedagogy for the future?

An independent report commissioned by Pearson (Anderson, 2014) and representing large companies and many senior figures from higher education recommended that England should adopt key competences as exemplified in the European Framework which they argue should be embedded in the inspection framework, the curriculum and qualifications. They also recommended

that project work as exemplified by the Extended Project Qualification (EPQ) should become a key requirement for university entrance. In supporting European transversal competences they advocated that such skills and attributes as team working, emotional maturity, empathy and other interpersonal skills are as important in employability as qualifications in English and mathematics. It is important to remember that this is not the universal view of employers and higher education, but the work of the Partnership for 21st Century Skills (<http://www.p21.org/>) demonstrates that it is a global push. Whilst recognising that there are powerful voices shoring up the case for a subject-based traditional curriculum, a change of policy in the direction of EBPL is not out of the question. We write this article to encourage this debate; what should and could curriculum and pedagogy look like in the future, and is there a role for EBPL? The content of this article draws upon interviews with teachers and students from a variety of courses and projects involving EPBL in north east England. For example, we have just completed a project in which the work of all the Y7 classes involved has been exhibited as display panels in the prestigious Great North Museum in Newcastle. In a Y4 class in another school pupils will be presenting their work on hay meadows and bees to members of the local community in one of the (big) local gardens.

Characteristics of EPBL

Although there are significant variations between EPBL approaches and projects in schools, we would emphasise a few characteristics that epitomise both the joys and challenges they offer when done well:

- Whilst they draw upon subjects (often deeply) they cross traditional subject boundaries.
- They deal with substantive issues and challenges, which often require bigger blocks of time than are usually offered by traditional school timetabling.
- They offer students more scope for controlling and shaping their work and thinking.

We would add another characteristic which sadly is less common, but is particularly powerful in developing students' identity – that learning is fed by acknowledging other perspectives or voices which open students, and teachers, to having their perspectives changed. It is worth slowing down and just reading that list of characteristics again. At first sight they should not present schools with too much trouble, should they? As one thinks more deeply, and talks to teachers more about their experiences, so the realisation dawns that EPBL does not sit comfortably with much school improvement activity which focuses on pre-specified learning outcomes.

In primary schools EPBL has strong foundations in the use of Philosophy for Children and Community of Enquiry (<http://www.sapere.org.uk/>) and Mantle of the Expert (an enquiry approach using drama conventions, see <http://www.mantleoftheexpert.com/>). In secondary schools one of the more common manifestations of these rebellious urges is project-based learning (PBL). This can be seen in the number of schools engaging in Opening Minds (<http://www.rsaoopeningminds.org.uk/>). To this we can add Building Learning Power (<http://www.buildinglearningpower.co.uk/>) and more recently those schools being supported by teachers from High Tech High in California (<http://www.hightechhigh.org/pbl/>) through the Innovation Unit.

Any pedagogy has a number of characteristics and it is challenging to select one as a defining characteristic; this can cause disquiet amongst teachers and school leaders who can tend towards readily definable models. We will start by saying that enquiry in particular is **driven** by questions which in turn reflect student curiosity. Most lessons have questions or tasks but usually they originate with the teacher. When student questions and curiosity are given credence, it is far

more likely that there will be engagement, motivation and some stunning outcomes. It is quite possible for teachers to pose questions that do reflect student curiosity and thus it is possible to have teacher-led enquiries where the teacher has made an effort to stimulate curiosity and harvest the questions that result as the basis for an enquiry. But in the longer run one wants to see more scope for student curiosity channelled through various forms of disciplined enquiry. So EPBL (as practised by the teachers we have engaged with) varies and it is helpful to see it as encompassed by a number of other dimensions, for example:

1. the degree of support or scaffolding (strong v low teacher/adult support);
2. the orientation towards internal (school) or external audience;
3. the intensity (a short concentrated burst or spread over shorter blocks over an extended period);
4. the scope of enquiry (single discipline v inter-disciplinary);
5. stimulus (derived from a problem/issue v derived from rampant curiosity);
6. the degree of student cooperation (individual v collaborative);
7. the degree of metacognitive orientation (knowledge, learning and transfer treated as incidental v seen as critical);
8. the medium of the final product which might be very concrete (a meal, a gadget or a game) or very literate (an essay or report).

Any enquiry or project can be evaluated using these dimensions. This is a good strategy for generating an overview of the EPBL curriculum on offer. So, for example, taking one of the examples in the *Work that Matters* (Patton & Robin, 2012) publication by the Innovation Unit is **The Blood Bank Project** undertaken by High Tech High on a commission to educate people about diseases of the blood (such as leukaemia and sickle cell). An art teacher, a biology and multi-media teacher collaborated in inter-disciplinary style. It was carried out by 17-18 year-olds for 15-20 hours per week over 15 weeks resulting in an art gallery exhibition in which the student-generated animated video was shown as a means of public education. Thus this project had a moderate degree of teacher control and support, was strongly pitched towards

external audiences, was conducted over an extended period by groups (but with 15-20 hours per week), across school subjects, and was derived from a serious public health issue. In contrast, a Community of Enquiry lesson in a primary school, focusing on the best variety of potato to grow in a school allotment, might be completed in 50 minutes and have no external audience. It might have a high degree of pupil control and curiosity but with the only product being the discussion and thinking about how you might judge the best potato variety.

Many will want to know if EPBL 'works', and might turn to the Endowment Education Fund *Teaching and Learning Toolkit* (<http://educationendowmentfoundation.org.uk/toolkit/toolkit-a-z/>) list of interventions which have become a benchmark for judging the relative impact of possible educational changes. Sadly neither enquiry- nor project-based learning figures by name in the *Toolkit*, although four out of the top five topics (Feedback, Metacognition and Self-regulation, Peer Tutoring and Collaborative Learning) could be seen as integral aspects of good EPBL. The evidence from other sources is not overwhelming but it is promising (see Barron & Darling-Hammond, 2009, for a review of the available evidence). Ultimately if you do base your decisions on likely impact on 'hard' data from public examinations and league tables of interventions, you might put your money elsewhere. Those who are advocates do pay attention to data, but very often their motivation comes from a values stance in which relevance, collaboration, authenticity, engagement, resilience, responsibility and autonomy are likely to feature. Furthermore they point to the experiential evidence of watching students engaged in EPBL. But, as with all pedagogies or interventions, it is not what you do but how you do it. If EPBL is implemented poorly, the outcomes will be disappointing.

Revolution or evolution?

So should we see EBPL as a revolution or an evolution? By 'revolution', we don't mean a complete rewrite of the National Curriculum (again), although some change in the longer run might be helpful. By revolution we mean a complete change of thinking about education, schools and

the curriculum. By evolution we mean a quiet chipping away at developing EPBL practice. The example of High Tech High given above might lead us to conclude that revolution is the best approach. The circumstances were special, a clean slate and fewer constraints than in England. Like all the complex problems, the answer is complicated.

At this point we want to introduce a term which might seem a bit abstract but which helps to explain why teachers and schools find it so difficult to introduce creative approaches to the curriculum – the term is *dominant discourse*. We associate discourse with talk, but it has wider meaning. Discourse can also be thought of as how we think, talk and act as a result of way that power is exercised. The government has power in education and the way it is used means that most teachers and school leaders think, talk and structure their working life around standards and targets. Discourse shapes our minds and a dominant discourse dominates our minds. We will indicate through a couple of research studies how discourse manifests itself. In Spain, Pozuelos *et al.* (2010) carried out a study of the implementation of an enquiry curriculum project *Exploring Our World* (age 6-12). They concluded that the teachers did not find the structure and culture of their schools generally supportive for such significant educational change, and we would argue that this is because the *dominant discourse* gives more weight to more convergent, transmission styles of teaching. The authors reached the trenchant conclusion that **‘Enquiry-based learning runs up against the whole fixed and immovable school machinery’**.

Nearer to home, Payton & Williamson (2008) have analysed the problematic practicalities of teachers using the *Enquiring Minds* project in trial schools. One should remember that the schools had volunteered for the project, which had high profile backing from Future Lab (funded by Microsoft). The findings are fairly similar to the Spanish study as these illustrated by these problematic issues:

- teachers did not understand EBL very well;
- timetabling, as they needed longer blocks of time;
- continuity – as they had no

framework to chart progression;

- resources for EBL;
- the space needed for a different style of learning.

Furthermore several teachers really struggled with the tension between their identities as teachers of particular subjects and teaching more open, inter-disciplinary enquiries requiring knowledge of other subjects, and the authors concluded (p.25):

the programming of the school initiatives reported here has tended to isolate them from other subjects. In none of the schools was there a concerted effort to ensure that the skills and aptitudes of enquiry-based learning, information management and so on were embedded across the routines of the school. While certain teachers did report that they had imported aspects of these initiatives into their subject teaching, these were individual examples and not endorsed systematically across any one participating institution.

EBL and more convergent, subject-focused teaching might be considered as oil and water – the dominant discourse of traditional teaching leaves little space for alternative approaches, unless the innovators are extremely determined.

So, to answer our own question, for marked progress in developing EPBL you need both revolution and evolution or, to put it another way, you need big picture and small detail in order to make that progress. The big picture is the curriculum vision and commitment on behalf of the senior leadership team and, in the current climate, changing the school discourse (as above) is equivalent to a revolution. The ways that learning is assessed and accredited would change, thinking about staffing would change, meeting agendas would change, ideas about learning spaces would change, formal and informal language about learning would change. High Tech High has a different discourse. However, as many will be familiar with, the big picture needs to be balanced by the hard graft of planning and conducting authentic enquiries which take student learning to new places and begin to change them as people. This is accomplished through the efforts of hardworking, creative and resourceful teachers who continually

learn from experience to develop their practice.

Far from California and Finland is Armthwaite School a three-class rural primary school in Cumbria. It provides an example of an English school which revolutionised its curriculum thinking - http://www.armthwaite.cumbria.sch.uk/index.php?category_id=18 . The revolution is evident in the website, not least through the existence of a community development officer who explores and organises a myriad of links with the community (local and global) through the school's Virtual Learning Environment. Many schools have similar projects to Armthwaite but it is the thinking about the curriculum at the heart of the school that shows the shift. (If you can make the time, check out the website and ask yourself “Could this be our school?”). Perhaps this is easier to do when setting up new schools, where expectations are not routinised and all decisions are new. This is exemplified by the new Apollo Studio Academy in County Durham (www.apollostudioacademy.co.uk) which has adopted a PBL approach to part of new curriculum. Students there recently created the glamour of a ‘Look good for less’ fashion show when thinking ahead to their prom and learning about the financial pressure that proms can put on families.

Hybrid EPBL compromises

In an unfettered model of EPBL, the enquiry would be driven and guided by an enquiry question, often where there is no perfect answer or solution. In ideal circumstances students might be involved in formulating the question or questions. The enquiry might cross subject boundaries and allow students to follow their ideas and interests - developing ‘ways of knowing’ and not just ‘states of knowledge’ (Bernstein, 1975, p.83). The enquiry might consume 40 hours of classroom time. The reality in most schools, however, is that as a result of the *dominant activity*, teachers who value EPBL are rarely able to pursue these purest goals; instead they implement lessons that compromise on some of the characteristics of EPBL – in effect a ‘hybrid’ (Sannino, 2008, p.337). For example cross-subject EBPL is used only in Year 7, before students revert to single subject teaching, or enquiries

are squeezed in after all significant assessment is over. In some schools more open enquiry approaches are used with lower attaining students, in pursuit of engagement or because they are perceived as lower risk in terms of target metrics. This is illustrated by an interview with a geography teacher working in a very high achieving secondary school. She reported that although EPBL seemed to be supported, it was only permissible in the words of her line manager if it “did not impede the end of unit test” (even at Year 7), as these tests were used to determine target grades and these grades determined ability sets for teaching, and these sets determined GCSE options.

The tensions in EPBL

We have considerable qualitative evidence of the positive effects of enquiry on students. However the positive effects simultaneously caused tensions for both teachers and students alike. Some of these tensions arose from the fact that when the balance of power was shifted and students were given more choice and responsibility, the familiar and safe world of the classroom was undermined. When the normal rules and traditional roles were altered, both the teachers and students often did not know how to respond. Although these tensions only applied to some of the teachers and students, or applied at some moments, they remain formidable stumbling blocks.

Well, we didn't really understand it that much because we'd never done it before and we were thinking 'why haven't we been told what to do?' Why are we being sent off to do something we've never done? (Y8 student)

Even the students detected that enquiry methods were causing their teachers a level of discomfort that they could sense:

They are used to their old teaching methods so they don't enjoy enquiry as much as they enjoy doing the lessons they used to do because that is easier because they have been doing it for so long. (Y9 student)

For students in particular, whose own understandings of school and classroom behaviour can be conservative, the response was often to want to 'reinstate

the familiar, the comfortably predictable' (*ibid*, p.142). Some students said they preferred routine work at tables from text books and felt discomforted that they had to make so many decisions:

I would rather work from text books for my GCSEs, I don't know why, but I prefer text books and answering questions in tests. (Y9 student)

Other students demonstrated an inability to self-regulate and take control of their learning, which resulted in off-task behaviour and incomplete work.

... you'd start fighting because there was no one there to tell you what to do, (no) one person, there were a lot of people who wanted to do different things, so it wasn't just one person telling you what to do, what you HAD to do.

There are some people who mess about who haven't been given anything to do so they get to do what they want. They go away and build a tower or something instead of being on task. (Y9 student)

The most significant tensions though arose when the students in the projects began to approach their exams. Exams usually require a 'right' answer and so the adoption of a pedagogic approach which was underpinned by a shift of responsibility was felt by many students to cause them unnecessary stress:

It's frustrating while you're doing it because even though you know he's trying to give out teamwork skills and getting you to learn to think for yourselves, instead of relying on him, we're still all in the middle of our GCSEs and we just want you to give us the right answers so we can learn it and I think that's what is stressful for a lot of people. We just want the correct answers so we can go and learn them instead of having to go and find it. (Y10 student)

With a dominant discourse in England which promotes a view of a successful education as passing exams, getting good grades and then going to college or university, it is understandable that students in this climate feel under intense pressure to demonstrate 'success' in this

way. For the students to accept that they are capable of learning enough to pass an exam through their own efforts would require a shift in their 'epistemological perspective' (Hockings, 2009, p.91) away from the teacher as the font of all knowledge. For many students, at exam-time, this is a step too far. This is ultimately why evolution begins to hit a glass ceiling and tensions arise, because the official 'message systems' are telling everyone that the dominant discourse is the one that counts.

Conclusions - providing better ecological conditions

Despite the many positive outcomes of introducing hybridised EPBL, the consequences often induce confusion and contradiction. Whilst evolution, or small scale experiments by individuals and groups of teachers, can offer new models of schooling, it is extremely challenging to take them to scale in the current policy and practice context. When they are only small scale experiments teachers and students have some difficulty in reconciling the nature and purpose of the conflicting pedagogies. In very favourable circumstances, such as High Tech High or Armathwaite School, they can become the new norm. But where the accountability pressures make senior leaders risk averse, EPBL will be confined to small niches in schools. The consequent loss for some pupils is that the very positive learner identities that can emerge from EPBL are curtailed. Where EPBL activity persists schools and teachers need to be explicit about the purposes and outcomes from subject-based transmission teaching and the contrasting EPBL pedagogy. Akkerman & Van Eijck (2013, p.61) have drawn attention to the discontinuities and boundaries between different learning contexts and communities, stressing the differences between inside school and outside school:

learners, during learning processes within school contexts, may draw from and negotiate between different communities ... both within, as well as outside, school. In so doing, assumed boundaries between 'inside' and 'outside' school turn out to be porous and complex.

We would argue that students can experience boundaries, not only between

inside and outside school, but also between different curriculum models within school. As a consequence there is a pressing need for a more explicit language of learning that helps students to bridge between learning contexts and communities.

In relation to teacher anxieties, it is evident that teachers adapt to the contexts in which they work, based on their beliefs, and their own sense of agency (the ability to act and bring about change). More recently, however, the concept of ecological agency (Biesta & Tedder, 2007) has emphasised the importance of the local conditions in which teachers operate. In this view, agency is not something you have; instead it is stimulated by your work environment. This social and cultural context can be seen to encourage or discourage teachers to act on their motivations. For example, if they believe that EPBL presents a risk to order and predicted results, then being encouraged by school leaders, academy chain staff, university staff or business leaders provides some incentive. Where teachers perceive that they have greater freedom to act, they are more likely to do just that. If that support is not there, teachers are likely to curtail their ambitions. Revolution in school policies or indeed national policies can change the context.

A deputy headteacher we interviewed reflected that “teachers are obedient – they do what they are told”, and this might explain the conflicts that are felt by many who want to innovate with teaching, learning and curriculum, but feel exposed when they do so. The dominant expectation on teachers’ practice is that it is ‘good’ or ‘outstanding’ in Ofsted terms. One teacher stated that she had feedback from a lesson observation in which she had been rated as ‘good’ rather than ‘outstanding’ because one student was deemed to be passive. Her own perception of the situation was that the student was “really thinking” and she had seen that as a positive outcome of a more metacognitively-based lesson. This pressure to perform to ever-shifting expectations can leave teachers feeling that they simply need to ‘play the game’, and, as one interviewee reported, lead senior leaders to develop and impose a ‘house style’ for teaching and learning as a means to reduce risk. Ecological

conditions can have very powerful effects on agency.

Developing an alternative discourse

One of the impressive features to emerge from the interviews is that, despite the problems and contradictions encountered by the teachers in the shape of the dominant discourse, they still persevered in developing PBL/EBL. At two levels we know that networks have a sustaining effect on teachers’ professional learning. Firstly there is considerable evidence supporting the idea of communities of practice, which is epitomised in Helen Timperley’s 2007 review of what is known about professional learning that has a positive effect on student outcomes. Secondly our own experience strongly reinforces this premise – if committed people work together they can generate an *alternative discourse* in which EPBL can co-exist with a more convergent, exam-oriented curriculum. Our research centre, as with one or two others in the UK, offers encouragement to develop EPBL approaches. In very simple terms, we are providing a mediating and brokering role and thus providing support to teachers. It should be noted that we do not work alone and that there are other crucial allies in the networks. The interviews suggested that two particularly valuable roles are performed:

1. Facilitating networks

There is significant networking between schools, but this is often at headteacher and senior leader level and often either based on geographical proximity, sector (e.g. primary) or personal relationships. We are responsible for some additional ‘diagonal’ networking – between disparate schools, between individual teachers and between schools and other partners with an interest in EPBL. This has been achieved through conferences, higher degree modules, receptions, email bulletins and involving schools in funded projects. This was referred to by one interviewee as “building a coalition of support”. An interviewee from a charity that works with schools on outdoor learning and schools grounds explained that a conference that she had attended had been valuable to her because generally she works on her own and the conference had provided her with a wider perspective of what others were doing

and saying. However the limits to the networking efforts are also perceived, first by an educational officer and then by a teacher:

There needs to be something like Blackboard (a VLE) that contains examples (of E/PBL) and where you could broker partnerships – a shop front in effect.

It would be good to have some outside agency involvement or developing resources – a university hub or an online hub to have a place to share ideas and resources and give ideas for enquiry topics.

2. Providing practical tools

The university also provides some practical tools for teachers and schools, such as Project Tuning and SOLES (Self-Organised Learning Environments). Although the use of Project Tuning was being introduced through the visits of teachers from High Tech High to some of the region’s schools, it was also offered through conference sessions and masters modules. SOLES based on the work of Sugata Mitra were also demonstrated at a variety of settings. This is in addition to a variety of enquiry pedagogical strategies.

However the relative strength of the efforts by the university is reflected in this contribution:

There is a need to encourage and support teachers and give them space, the permission, time and confidence to try these things. Teachers are being failed in their initial training and CPD. ITT is crucial and is an issue when it comes to working innovatively – many teachers are just not used to working in this way and they are under pressure from Ofsted, SATs ...

If we want to see a change in education there are three levels of influence – lobbying policy makers, as the influence of research is important here; it is important to work at leadership level and ITT and CPD.

Our efforts to this date do not match such aspirations, but we are still working on it.

References

- Akkerman, S. & Van Eijck, M. (2013). Re-theorising the student dialogically across and between boundaries of multiple communities. *British Educational Research Journal*, 39 (1), 60-72. DOI: 10.1080/01411926.2011.613454.
- Anderson, R. (2014) *Making Education Work – A Report from an Independent Advisory Group*, Chaired by Professor Sir Roy Anderson, London: Pearson.
- Bernstein, B. (1975) *Class, Codes and Control Volume 3: Towards a Theory of Educational Transmissions* (second edition) London. Routledge & Kegan Paul.
- Barron, B. & Darling-Hammond, L. (2010) Prospects and challenges for inquiry-based approaches to learning, in OECD *The Nature of Learning Using Research To Inspire Practice*. Paris: OECD.
- Biesta, G. & Tedder, M. (2007). Agency and learning in the lifecourse: Towards an ecological perspective. *Studies in the Education of Adults*, 39(2), 132-149.
- Hockings, C. (2009). Reaching the students that student-centred learning cannot reach. *British Educational Research Journal*, 35(1), 83-98.
- Patton, A. & Robin, J. (2012) *Work that matters – The teacher's guide to project-based learning*. London: Paul Hamlyn Foundation (website accessed Dec 2014).
- Payton, S. & Williamson, B. (2008) *Enquiring Minds – Innovative Approaches to Curriculum Reform*. Bristol: Future Lab.
- Pozuelos, F., Gonzalez, G. & Canal de Leon, P. (2010) Enquiry-based teaching: teachers' conceptions, impediments and support. *Teaching Education*, Vol. 21 (2), pp. 131-142.
- Saninno, A. (2008). Sustaining a non-dominant activity in school: Only a utopia? *Journal of Educational Change*, 9, 329-338.
- Timperley, H., Wilson, A., Barrar, H. & Fung, I., (2007) *Teacher professional learning and development: Best evidence synthesis iteration*. Wellington, New Zealand: Ministry of Education. Available from <http://www.minedu.govt.nz/goto/bestevidencesynthesis>.

DAVID LEAT is Professor of Curriculum Innovation, Research Centre for Learning and Teaching, School of Education, Communication and Language Science at Newcastle University.

RACHEL LOFTHOUSE is Head of Teacher Learning and Development (Education Section), School of Education Communication and Language Sciences at Newcastle University.
rachel.lofthouse@ncl.ac.uk

ULRIKE THOMAS is a Research Associate in the Research Centre for Learning and Teaching at Newcastle University. Before embarking on a career in research she was a primary school teacher for nine years. Her interest in enquiry and project-based learning has developed as a result of her involvement in a range of research projects which have examined the impact of innovative pedagogy and curricular on students and teachers. She is currently working with a consortium of schools that are developing an enquiry/project-based approach to teaching and learning. She was also project manager of the Skype Seniors Research project which explored the impact on curriculum and pedagogy of intergenerational learning and new 'voices' in the classroom.